

NOTES ON COSTA RICAN *PEPEROMIA* (PIPERACEAE), INCLUDING FOUR
NEW SPECIES

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ABSTRACT

Four new, ostensibly endemic, Costa Rican species of *Peperomia* are described: *Peperomia hammelii* Grayum, *P. saintpauliella* Grayum, and *P. trichomanoides* Grayum are all terrestrial or epilithic species restricted to the southern Pacific slope, mainly in limestone habitats. *Peperomia ursina* Grayum comprises epilithic or epiphytic plants from the lower Atlantic slope of the Cordillera de Talamanca. *Peperomia tenuifolia* C. DC., heretofore considered a synonym of *P. lignescens* C. DC., is reinterpreted as an older name for the species heretofore called *P. killipii* Trel. Revised synonymies are provided for *P. lignescens* and *P. tenuifolia*.

KEY WORDS: Costa Rica, *Peperomia*, Piperaceae, systematics

The Costa Rican members of the huge, pantropical genus *Peperomia* (Piperaceae) were most recently treated by Burger (1971), who accounted for 66 species. Since that time, intensive collecting efforts in previously underexplored regions of the country (particularly the Cordillera de Talamanca) have resulted in the addition of at least fifteen species to this total. Most of these additions have involved species already described from other countries, but a few appear to represent new taxonomic entities. Four new Costa Rican species of *Peperomia* are described hereunder, and a fifth additional species is freed from synonymy under a name accepted by Burger.

PEPEROMIA HAMMELII Grayum, *spec. nov.* TYPE: COSTA RICA. Puntarenas: Cantón de Osa, Fila Costeña, Fila Cruces, cabeceras del Río Piedras Blancas, Cerro Anguciana, faldas al oeste, bosque en roca de cal, 8° 48' 56" N, 83° 10' 37" W, 1,400-1,600 m, 10 Dec 1993, Hammel 19274 (HOLOTYPE: INB!; Isotypes: BM!, COL!, CR!, F!, MO!).

P. lignescens C. DC. affinis, a que imprimis differt caule trichomatibus multiseriatis vesicariis vestito petiolis in longitudinem late alatis laminis foliorum hirsutis pedunculis longioribus.

Plants terrestrial or epilithic. Stems erect, to ca. $23 \times 0.2-0.5$ cm, densely clothed with stout, multiseriate, inflated hairs to ca. 1 mm long. Leaves alternate. Petiole 1.2-4.6 cm, broadly alate throughout its length, ca. 2-6 mm wide, hirsute on both sides. Lamina 5.5-11.0 \times 2.5-7.2 cm, ovate to broadly elliptic, impeltate, broadly cuneate to rounded or subcordate at base, subacute to subacuminate apically, pinnately nerved with ca. 5-6 primary lateral veins per side, dark-gland-dotted and hirsute on both surfaces. Inflorescences solitary at stem apex. Peduncle 2.7-3.8 cm, to ca. 1 mm wide, glabrous or with few scattered hairs toward base. Spike 1.7-8.5 \times 0.2-0.4 cm, white. Flowers moderately separated; rachis glabrous; bracts 0.5-0.6 mm wide, suborbicular, densely glandular-punctate; anthers broadly elliptic to oblong, ca. 0.25 mm. Fruits unknown.

Peperomia hammelii is known only from the type locality, on the western slope of Cerro Anguciana, the highest peak in the Fila Costeña in the southern Pacific region of Costa Rica. Here, it grows on or near limestone cliffs or outcrops at 1,400-1,600 m elevation.

Peperomia hammelii is an unusually well-marked species in uniquely combining two features which, even by themselves, are anomalous within the genus: an indument of odd, inflated hairs, and broadly and extensively alate petioles. In its terrestrial or epilithic habitat, erect, caulescent habit, alternate, pinnately veined leaves and dark, sessile laminar glands it most closely resembles *P. lignescens* C. DC. and allies, to which it is perhaps intimately related. *Peperomia lignescens*, which is parapatric and at least conceivably syntopic with *P. hammelii*, differs from the latter in having generally puberulent or glabrescent (rather than hirsute) foliage and shorter peduncles (in addition to the characters mentioned previously).

I take great pleasure in dedicating this new species to its discoverer, Dr. Barry E. Hammel of the Missouri Botanical Garden, a long-time student of the Neotropical flora and my colleague on the "Manual to the Plants of Costa Rica" project.

Numerous Costa Rican collections have accrued in recent years of yet another *Peperomia* species that agrees in a general way with the description of *P. lignescens*, but which differs in having consistently palmate leaf venation. These collections are all from the humid Pacific lowlands (0-1,600 m), south from the Río Grande de Tárcos. They key out easily to *Peperomia killipii* Trel. in Yuncker's (1950) *Flora of Panama* treatment, and are an excellent overall match for the holotypes of *P. killipii* and its synonym (*vide* Yuncker) *P. hymenodes* Trel.

Peperomia lignescens was not treated by Yuncker (1950), while *P. killipii* was only briefly mentioned by Burger (1971: 65) in comparison with *P. pseudodependens* C. DC. (= *P. asarifolia* Schldl. & Cham.), a somewhat similar species that also has palmate venation. Due to the venation difference, *P. killipii* will not key out anywhere near *P. lignescens* in Burger's (1971) treatment. Nevertheless, type material of both *Peperomia aguacatensis* C. DC. and *P. tenuifolia* C. DC., two of the five heterotypic names listed in synonymy under *P. lignescens* by Burger (1971), agrees in all critical

details with that of *P. killipii*. As both *P. aguacatensis* and *P. tenuifolia* substantially predate *P. killipii*, the last-mentioned name must fall into synonymy.

The following paragraphs provide what I presently consider to be complete synonymies for the two species I propose be called *Peperomia lignescens* C. DC. and *P. tenuifolia* C. DC. This is necessary not only to clarify the confusion detailed above, but also to establish precedent in two cases of equal priority.

PEPEROMIA LIGNESCENS C. DC., J. Bot. 4:137. 1866.

Peperomia carlosiana C. DC., J. Bot. 4:140. 1866.

Peperomia carthaginensis C. DC., Linnaea 37:377. 1872. *Peperomia lignescens* C. DC. var. *carthaginensis* (C. DC.) Trel., Contr. U.S. Natl. Herb. 26:193. 1929.

Peperomia lignescens C. DC. var. *subcuneilimba* Trel., Contr. U.S. Natl. Herb. 26:193. 1929.

Peperomia jilotepequeana Trel. & Standl. in Standl. & Steyerl., Fieldiana, Bot. 24(3):254. 1952.

PEPEROMIA TENUIFOLIA C. DC., Linnaea 37:371. 1872.

Peperomia aguacatensis C. DC., Linnaea 37:376. 1872.

Peperomia killipii Trel., Bot. Gaz. 73:143. 1922.

Peperomia hymenodes Trel., Contr. U.S. Natl. Herb. 26:43. 1927.

Peperomia tenuifolia differs from *P. lignescens* not only in its palmate leaf venation, but also in its usually epiphytic habit (it may occasionally be epilithic), absence of conspicuous dark, sessile laminar glands, and minutely papillate inflorescence rachis. Furthermore, it is a species of generally lower elevations (though there is considerable overlap). I select the names *P. lignescens* and *P. tenuifolia* because they have already been more widely applied in herbaria than their alternatives, and because both *P. carlosiana* and *P. aguacatensis* are inappropriate toponyms.

PEPEROMIA SAINTPAULIELLA Grayum, *spec. nov.* TYPE: COSTA RICA. Puntarenas: along short-cut road to Golfito from Villa Briceno on Interamerican Hwy., W side of Fila Gamba, ca. 6 km from Golfito airport, 8° 41' 30" N, 83° 12' W, < 100 m, 6 Mar 1985, Croat & Grayum 59911 (HOLOTYPE: CR!; Isotypes: BM!, MO!).

P. insueta Trel. affinis, sed differt laminis foliorum (1.7-)2.0-3.9 cm longis ovatis vel suborbicularis pedunculis 1.6-3.7 cm longis spicis 7.3-16.1 cm × 0.4-1.0 mm.

Plants terrestrial or epilithic. Stems erect to ± decumbent, 0.8-1.3 × 0.2-0.3 cm. Leaves alternate in basal rosette. Petiole 1.3-7.4 cm, spreading-hirsute with uniseriate hairs. Lamina (1.7-)2.0-3.9 × 1.80-4.65 cm, broadly ovate to orbicular (or rarely obovate), impeltate, cordate or (rarely) subsagittate at base with sinus to 0.7 cm deep and posterior lobes rounded to subtruncate or (rarely) obtuse, nearly truncate or

rounded to obtuse apically, palmately (5-)7(-9)-nerved, pellucid-gland-dotted on both surfaces, sparsely to moderately hirsute on both sides (especially along major veins abaxially). Inflorescences solitary, basal. Peduncle 1.6-3.7 cm, with hairs like petiole. Spike 7.3-16.1 cm \times 0.4-1.0 mm, pinkish. Flowers \pm crowded at first, becoming distant; rachis virtually glabrous; bracts 0.4-0.5 mm wide, \pm peltate, elliptic, covered with orange, sessile glands; anthers broadly elliptic, ca. 0.2 mm. Fruits ca. 0.5-0.6 \times 0.4-0.5 mm, \pm globose-bodied, broadly narrowed to substipitate base, beakless; stigma apical.

Additional specimens examined. COSTA RICA. Puntarenas: Cantón de Osa, forest along Quebrada Benjamín, near crossing of trail from Palmar Norte to Jalisco, 8° 58' N, 83° 28' W, ca. 160 m, 14 Dec 1989, *Grayum & Hamnel* 9543 (BM, INB, MO); Cantón de Osa/Buenos Aires, western part of main ridge of Fila Retinto, along and near trail (not on current maps) from Palmar Norte to Jalisco, 8° 59' 30" N, 83° 28' W, ca. 780-960 m, 9 Dec 1988, *Grayum & Herrera* 9150 (MO).

Peperomia saintpauliella is apparently confined to a small area to the north and east of Golfo Dulce in Puntarenas Province, from near Palmar Norte to the vicinity of Golfito. Here, it grows near forest creeks, often on vertical rock (usually specified as limestone) faces, at ca. 50-800 m elevation.

Peperomia saintpauliella comprises smallish, acaulescent plants with impeltate, suborbicular leaves and solitary, basal inflorescences. As the specific epithet implies, living specimens bear a strong vegetative resemblance to smaller forms of the cultivated African violet (*Saintpaulia ionantha* H. Wendl.), and have a similarly compact, ornamental appearance. Living material of *P. saintpauliella* is in cultivation at the Missouri Botanical Garden, and plants have been put on display in the Climatron.

Other *Peperomia* species most resembling *P. saintpauliella* are the Colombian *P. macrotricha* C. DC. and the Panamanian *P. unbrigaudens* Yunck. and, especially, *P. insueta* Trel. The last-mentioned species differs from *P. saintpauliella* in having longer (4.0-7.5 cm), narrowly elliptic to \pm ovate leaf blades, absolutely and relatively much longer peduncles (about as long as the spikes), and generally shorter and thicker spikes (6-12 cm \times 1.0-1.5 mm).

PEPEROMIA TRICHOMANOIDES Grayum, *spec. nov.* TYPE: COSTA RICA. Puntarenas: Cantón de Osa, Fila Costeña, Fila Cruces, cabeceras del Río Piedras Blancas, Cerro Anguciana, faldas al Oeste, bosque en roca de cal, 9° 48' 56" N, 83° 10' 37" W, 1,400-1,600 m, 10 Dec 1993, *Hamnel* 19273 (HOLOTYPE: INB!; Isotypes: BM!, CR!, MO!).

Differt a *P. saintpauliella* Grayum dimensionibus uniformiter parvioribus pedunculis relative longioribus rhachidi inflorescentiae dense pubescenti; a *P. tuerckheimii* C. DC. laminis foliorum impeltatis basi cordatis relative latioribus venis primariis basalibus plerumque 7.

Plants epilithic, the leaves and spikes flattened against rock. Stems short and thick, subcormose, ca. 0.2-0.8 × 0.15-0.25 cm. Leaves apparently alternate, in basal rosette. Petiole 0.3-1.9 cm, spreading-hirsute with uniseriate hairs. Lamina 0.5-1.8 × 0.5-1.8 cm, broadly ovate to suborbicular or subreniform, impeltate or scarcely peltate, cordulate or cordate at base with sinus to 0.25 cm deep and posterior lobes rounded to subtruncate, broadly rounded to subacute apically, palmately 3-5-nerved, pellucid-gland-dotted at least above, appressed-hirsute on both sides (more sparsely so above). Inflorescences solitary, basal. Peduncle ca. 1.3-4.1 cm, pubescent as petiole. Spike 2.7-7.0 cm × 0.2-0.9 mm. Flowers becoming distant; rachis ± densely spreading-pubescent; bracts 0.3-0.4 mm wide, ± peltate, suborbicular, densely dark-pellucid-punctate; anthers broadly elliptic-oblong to suborbicular, ca. 0.25-0.30 mm. Fruits ca. 0.5-0.6 × 0.3-0.4 mm, ellipsoidal to subglobose, narrowed to substipitate base, beakless; stigma apical.

This species is known only from the type locality, at 1,400-1,600 m elevation on the steep limestone ramparts of Cerro Anguciana, the highest peak in the Fila Costeña of southern Pacific Costa Rica.

Peperomia trichomanoides is so named because its habitat (epilithic and growing among mosses), appressed habit, and small size recall some species of the fern genus *Trichomanes* L. (Hymenophyllaceae). Plants of this species resemble, in general aspect, miniature versions of *P. saintpauliella* (described above), from which they differ not only in their uniformly smaller dimensions, but also in having proportionately longer (relative to the spike) peduncles and densely pubescent (rather than essentially glabrous) inflorescence rachises. In the latter respect, *P. trichomanoides* approaches some specimens of *P. tuerckheimii* C. DC. (including *P. hispidorhachis* Yunck. and *P. tecticola* C. DC.), another small calciphile that occurs in the same vicinity; however, *P. tuerckheimii* has clearly peltate, non-cordate, more elongate leaf-blades with generally 7 (rather than 5) primary basal veins.

PEPEROMIA URSINA Grayum, *spec. nov.* TYPE: COSTA RICA. Limón: Cordillera de Talamanca, along ridge descending to main fork of Quebrada Cañabral from divide between basin of Río Madre de Dios and that of Río Barbilla, 10° 02' N, 83° 25' W, 280-400 m, 6 Sep 1988, Grayum, Herrera, & Robles 8842 (HOLOTYPE: INB!; Isotypes: BM!, COL!, F!, MO!).

Differt a *P. alata* Ruiz & Pav. pubescentia dense uniformiterque hirsuta; a *P. tuisana* C. DC. atque *P. montecristana* Trel. petiolis brevioribus inflorescentiis multo brevioribus.

Appressed-climbing trunk epiphytes or epilithic, stoloniferous. Stems erect to ± decumbent, ca. 2-8 × 0.10-0.15 cm, spreading-hirsute with uniseriate hairs. Leaves alternate. Petiole 0.1-0.3 cm, pubescent as stems. Lower leaves ± reduced; medial and distal laminae 1.0-3.6 × 0.5-1.5 cm, narrowly elliptic to rhombic, impeltate, acute at base, subacute to subacuminate at apex, ± obscurely 3-nerved from base, hirsute on both surfaces. Inflorescences solitary at stem apex. Peduncle 0.1-1.0 cm, spreading-

hirsute. Spike 1.3-5.0 cm \times 0.7-1.5 mm, yellow-green. Flowers moderately separated; rachis glabrous; bracts 0.3-0.4 mm wide, suborbicular, densely glandular-punctate; anthers broadly elliptic, 0.15-0.25 mm. Fruits ca. 0.5-0.6 \times 0.5-0.6 mm, globose-bodied, rounded at base, exserted on triangular stipe ca. 0.5-0.6 mm, papillate, with stout, conical beak to ca. 0.15 mm.

Additional specimens examined. COSTA RICA. Limón: Reserva Indígena Talamanca, camino a Soki entre la Quebrada Amubri, margen izquierda de Río Lari, 9° 29' 40" N, 82° 59' 40" W, 200 m, 28 Jun 1989, A. Chacón 20 (BM,CR,MO).

As far as is presently known, *Peperomia ursina* is restricted to the Atlantic slope of the Costa Rican Cordillera de Talamanca from ca. 200-400 m. According to collectors' notes, the plants may be either epilithic or epiphytic on trunks.

Peperomia ursina is most similar and perhaps most closely related to *P. alata* Ruiz & Pav. and allied species characterized by alternate, distichous leaves with thin, palmately veined blades, and solitary inflorescences. It differs sharply from most species in this group in its dense, uniform hirsute pubescence, reflected in the specific epithet. This species will key to the vicinity of *P. tuisana* C. DC. and *P. montecristana* Trel. in Burger's (1971) treatment of Costa Rican Piperaceae, but differs from both in its shorter petioles and much shorter inflorescences.

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LITERATURE CITED

- Burger, W. 1971. Piperaceae. In, W. Burger (editor), *Flora costaricensis*. Fieldiana, Bot. 35:5-218.
- Yuncker, T.G. 1950. Piperaceae. In, R.E. Woodson, Jr. & R.W. Schery (editors), *Flora of Panama*. Ann. Missouri Bot. Gard. 37:1-120.